REMARKS

The Applicants sincerely appreciate the thorough examination of the present application as evidenced by the Office Actions of March 28, 2005, September 16, 2005, and March 28, 2006. In response, the Applicants have amended Claim 1 to further clarify the claimed invention; canceled Claim 5; amended Claims 6 and 7 to depend from Claim 1; canceled Claims 8-10 and 63-77; amended Claim 78 to further clarify the claimed invention; canceled Claims 95-109 and 111; amended Claim 112 to depend from Claim 12; amended Claim 115 to depend from Claim 7; amended Claim 118 to depend from Claim 1; canceled Claim 119; amended Claim 120 to depend from Claim 1; amended Claim 121 to further clarify the claimed invention; and canceled Claim 123.

In the following remarks, the Applicants will show that all claims are patentable over the cited art. A Notice of Allowance is thus respectfully requested in due course.

Independent Claim 1 Is Patentable

Claim 1 has been amended to include the recitations of Claim 5. Claims 1 and 5 have been rejected under 35 U.S.C. Sec. 102(b) as being anticipated by Japanese Publication No. 2001-160557 to Lim with U.S. Patent No. 6,570,253 (hereinafter "Lim") being identified as an equivalent translation. The Applicants respectfully submit, however, that Claim 1 is patentable over Lim for at least the reasons discussed below.

As amended, Claim 1 recites a method of forming an electronic device, the method comprising:

> forming a first electrode;
>
> after forming the first electrode, forming a dielectric oxide layer on the first electrode wherein the dielectric oxide layer includes titanium, wherein a first portion of the dielectric oxide layer adjacent the first electrode has a first density of titanium, and wherein a second portion of the dielectric oxide layer opposite the first electrode has a second density of titanium less than the first density; and
>
> after forming the dielectric oxide layer, forming a second electrode on the dielectric oxide layer so that the dielectric oxide layer is between the first and second electrodes.

Accordingly, a density of titanium in the dielectric oxide layer decreases with increasing distance from the first electrode on which the dielectric oxide layer is formed.

In contrast to the method of Claim 1, Lim discusses a composition transition layer 130 in which a concentration of titanium increases with increasing distance from the lower material layer 110 on which the composition transition layer 130 is formed. As shown in Figure 4 of Lim, a concentration of TiO_2 increases from 0% to 100% with increasing distance from the lower (first formed) material layer 110. Accordingly, Lim teaches away from a dielectric oxide layer having a density of titanium that decreases with increasing distance from a layer on which the dielectric oxide layer is formed.

The Applicants thus submit that Claim 1 is patentable over Lim. In addition, dependent Claims 2-4, 6-7, 11-13, 112-118, and 120 are patentable at least as per the patentability of Claim 1 from which they depend.

Independent Claims 78 And 121 Are Patentable

Claims 78 and 121 have been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over U.S. Patent No. 6,640,403 to Shih *et al.* (Shih) in view of Lim. As set forth above, Independent Claim 78 has been amended to clarify that "the second tantalum titanium oxide film has a titanium density less than a titanium density of the first tantalum titanium oxide film." Independent Claim 121 has been similarly amended to clarify that " the ~~first and~~ second density ~~densities~~ of titanium ~~are different~~ is less than the first density of titanium ". Claims 78 and 121 are patentable over the combination of Shih and Lim for at least the reasons discussed below.

Claim 78, for example, recites a method for manufacturing a semiconductor memory device, the method including:

> (a) forming a lower electrode on an upper surface of the semiconductor substrate;
> (b) forming a reaction suppressing layer on an upper surface of the lower electrode;
> (c) forming a first tantalum titanium oxide film on an upper surface of the reaction suppressing layer;
> (d) after forming the first tantalum titanium oxide film, forming a second tantalum titanium oxide film on an upper surface of the first tantalum titanium oxide film wherein the second tantalum titanium oxide film has a titanium density less than a titanium density of the first tantalum titanium oxide film;

(e) applying a thermal process to the first and the second tantalum titanium oxide films under an oxygen atmosphere; and

(f) forming an upper electrode on an upper surface of the second tantalum titanium oxide film,

wherein a density of titanium is adjusted to be 0.1 to 15 percent when the first tantalum titanium oxide film is formed.

Regarding Shih, the Office Action states that: "Shih teaches all of the positive steps of claim ... 78 ... except for the titanium density of the layer in different portions." (Office Action, page 6.) More specifically, Shih fails to teach or suggest a second tantalum titanium oxide film having a titanium density less than a titanium density of a first tantalum titanium oxide film, and Lim fails to provide the missing teachings for at least the reasons discussed above with respect to Claim 1. As further discussed above with respect to Figure 1, Lim teaches away from a dielectric oxide layer(s) having a density of titanium that decreases with increasing distance from a layer on which the dielectric oxide layer(s) is formed.

For at least the reasons discussed above, the combination of Shih and Lim fails to teach or suggest the recitations of Claim 78, and Claim 78 is thus patentable. Moreover, independent Claim 121 is patentable for reasons similar to those discussed above with respect to Claim 78. In addition, dependent Claims 122 and 125-136 are patentable at least as per the patentability of Claims 78 and 121 from which they depend.

CONCLUSION

Accordingly, the Applicants submit that all pending claims in the present application are in condition for allowance, and a Notice of Allowance is respectfully requested in due course. The Examiner is encouraged to contact the undersigned attorney by telephone should any additional issues need to be addressed.

Respectfully submitted,

Scott C. Hatfield
Registration No. 38,176

Customer Number 20792
Myers Bigel Sibley & Sajovec, P.A.
P.O. Box 37428
Raleigh, NC 27627
919-854-1400
919-854-1401 (Fax)

Certificate of Mailing under 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 27, 2006

Signature: _____
Joyce Paoli